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THE GEOLOGY OF THE EASTERN PART OF THE TOKO RANGE AND ITS FOOTHILLS

by

P. W. Pritchard

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SUMMARY

An apparently conformable sequence of Upper Cambrian and Lower and Middle Ordovician carbonate and sandy sediments is exposed on the eastern limb of a syncline whose axis lies along the physiographic axis of the Toko Range. This sequence is divisible into ten lithological units which are described in three groups.

INTRODUCTION

The Toko Range is a low plateau rising less than 300 feet above the surrounding countryside on the central western boundary of Queensland (locality map fig. 1). The range trends north-west and is about fifty miles long and twenty miles wide. Its northern end is flanked by low hills which decrease in height towards the Georgina River, and its southern end disappears below the sand of the Simpson Desert.

The results of reconnaissance mapping of the eastern part of the range and its foothills by the Bureau of Mineral Resources and the Queensland Geological Survey in 1958 and 1959 are summarized below.

STRATIGRAPHY

Lower Palaeozoic

The ten apparently conformable rock units recognized in the area represented by Fig. 1 are divisible into three lithological groups, the Georgina Limestone, the Ninmaroo Formation and the Toko Group.

Georgina Limestone (I on Fig. 1)

The usage of this term is established by Öpik (1956, p.22; 1959).

The Georgina Limestone consists of interbedded sets up to five feet thick of laminated and thin-bedded blue-grey calcilutite and white marl. The calcilutite is current bedded and ripple marked and shows small scale scouring. Oolitic limestone, intraformational breccia, two-tone (grey-blue and grey-brown) limestone, sandy limestone and calcareous sandstone are interbedded with the main rock types. The volume of these minor constituents increases towards the top of the unit.

No thickness has been measured. Tysons No. 1 Bore, nine miles south of Glenormiston Homestead, was started in a

horizon below the upper two-tone and sandy part of the sequence, and penetrated a vertical thickness of 1,810 feet of carbonate rock before it was abandoned.

Brachiopods, hyolithids and trilobites occur in the unit. Öpik (1959) lists the trilobites and considers that their age is lower Upper Cambrian.

Ninmaroo Formation (II on Fig. 1)

The present usage of the term Ninmaroo Formation is established by Casey 1959. Within the area represented by Fig. 1 the Ninmaroo Formation consists of five rock units.

Unit Cu-2. Laminated to medium-bedded, grey-brown dolomite, sandy dolomite, and dolomitic sandstone. Eight miles west of Glenormiston Homestead its thickness is estimated to be 200 feet.

Unit Cu-3. Sets up to ten feet thick of roughly thin-bedded two-tone (grey-brown and grey-blue) limestone; thin-bedded grey-brown calcilutite; thin-bedded grey-blue calcilutite; white marl; oolitic limestone; and algal colonies.

An incomplete section of 180 feet crops out on the northern side of the Ten Mile Hills. The full thickness there is estimated to be 350 feet.

Unit Cu/Ol-4. Thin to thick-bedded grey-brown dolomite and sandy dolomite, and laminated to thin-bedded dolomitic quartz sandstone in sets up to fifteen feet thick.

An incomplete section 78 feet thick is exposed on the north-western side of the Ten Mile Hills, and there the full section is probably 200 feet thick.

Nautiloid remains have been found at Lake Wonditti, and trilobites found thirteen miles south-east of Lake Wonditti are listed by Öpik (1959) and are thought by him to be of upper Upper Cambrian age.

Unit Ol/5. Sets up to ten feet thick of thin to medium-bedded two-tone (grey-blue and grey-brown) limestone; laminated and thin-bedded brown calcilutite; white marl; thin-bedded oolitic limestone; and algal limestone. At the top of the unit there are sets up to five feet thick of thin-bedded grey-brown coarse-grained calcarenite, and of laminated to thin-bedded fine-grained calcareous sandstone.

West of the northern end of the Ten Mile Hills an incomplete section 230 feet thick is exposed and there the unit is estimated to be 400 feet thick.

Nautiloids and ribeirioids similar to those found in the Ninmaroo Formation in the Burke River Structural Belt occur in this unit.

Unit Ol6. Sets up to twenty-five feet thick of thin-bedded and laminated fine-grained dolomitic quartz sandstone which is in places glauconitic; and laminated to medium- bedded ~~grained~~ grey-brown dolomite and white marl.

Brachiopods, nautiloids, trilobites, ribeirioids and tubular structures are common in the marl interbeds.

The unit is best exposed along the Mulligan River where it is estimated to be 250 feet thick.

Toko ~~Group~~ Beds (III on Fig. 1)

The present usage of the ~~Toko Group~~ term Toko Beds is established by Öpik (1956) considers its age to be upper Lower and probably lower Middle Ordovician. The group consists of five rock units.

Unit Ol-7. Sets up to twelve feet thick of thin-bedded two-tone (grey and grey-blue) limestone; thin to medium-bedded grey-brown calcilutite; and marl. The unit is visible south of Wheelaman Creek where it is estimated to be 100 feet thick. It contains gastropods, nautiloids, ribeirioids, tubular structures and horn-shaped fossils up to 2" long.

Unit Ol-8. Sets up to 25 feet thick of thin-bedded olive-brown dolomitic coquina, and laminated and thin-bedded green or brown very fine-grained sandstone which in places is glauconitic. The unit crops out in and in front of the scarp of the Toko Range and on the north-eastern edge of the range its thickness is estimated to be 250 feet. The unit is richly fossiliferous and contains: nautiloids, trilobites, brachiopods, pelecypods, gastropods, bryozoa and abundant tracks and tubular structures.

Unit Om-9. Medium to thick-bedded brown and white fine to medium-grained quartz sandstone with cross-bedded sandstone containing clay pellets at the base. The upper part of the unit is massive. The unit forms the resistant cap of the Toko Range scarp. It is estimated to be 200 feet thick.

Unit Om-10. Sets up to 30 feet thick of thin-bedded fine-grained brown and white quartz sandstone which in places is glauconitic, interbedded with gypsiferous green shale.

A seventy feet thick section near the top of the unit is exposed one mile north od Cravens Peak Bore and there the total thickness is estimated to be 200 feet. The unit contains abundant remains of trilobites, large nautiloids, and brachiopods, and numerous tracks and tubes.

Unit Om-11. Five feet of medium-bedded fine-grained quartz sandstone carrying clay pellets caps unit Om-10. This sandstone is apparently thicker south of the area of outcrop shown on Fig. 1.

Mesozoic

Undifferentiated Mesozoic sediments: The Ten Mile Hills are formed by an outlier of deeply weathered Mesozoic sediments which rest unconformably on the Lower Palaeozoic sequence. The positions of smaller outliers north, west, and south of the hills are shown on the map.

Seventy feet of the sequence is exposed at Mt. Idamea, where it consists of laminated and thin-bedded fine-grained micaceous quartz sandstone and shale interbeds, with five feet of conglomeratic sandstone at the base. Plant fossils occur thirty feet above the base of the sequence.

The Mesozoic sediments in the Ten Mile Hills area, together with the sandstone in the Lower Ordovician unit Ol-6 comprise the Pituri Sandstone of Whitehouse (1936, p.68). As a result, the name Pituri Sandstone is best discarded.

Longsight Sandstone and Wilgunyah Formation: These Lower Cretaceous formations of the Artesian Basin sequence are discussed by Reynolds elsewhere in this volume.

Tertiary

Austral Downs Limestone: The Tertiary limestone and chalcedony deposits along the valleys of Pituri Creek and the Georgina River are discussed by Paten elsewhere in this volume.

WEATHERING OF THE LOWER PALAEOZOIC SEDIMENTS

In places strong weathering of the Lower Palaeozoic sediments, whereby the limestone, marl, dolomite, and sandstone are silicified and, in part, brecciated and ferruginized, obscures the boundaries of the rock units. This weathered surface is the one on which the Mesozoic sediments were laid down.

STRUCTURE IN THE LOWER PALAEOZOIC SEDIMENTS

The major fold axes in the Lower Palaeozoic sediments trend north-west. The folding appears to be stronger south of an east-west line running through Glenormiston Homestead, and the east-west direction is followed by minor, almost monoclinal, cross-folds.

There is slight evidence for small-scale faulting trending roughly east-north-east. The fault shown at the northern end of the Toko Range may be one of the east-west cross-folds.

Two directions of strong jointing are developed, one between 70° and 100° and the other between 160° and 175°. A set of weak joints runs at 140°.

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GEOLOGICAL MAP OF THE EASTERN PART OF THE TOKO RANGE AND ITS FOOTHILLS

Fig. 1

138°00′ 22°30′ — 138°50′ 22°30′

Reference

Cainozoic
- Cza — *Alluvium*
- Czs — *Sand*

Tertiary
- Ta — Austral Downs Limestone: *Limestone and chalcedony*

Lower Cretaceous
- Klw — Wilgunyah Formation and Longsight Sandstone: *Shale*
- Kll — *Sandstone and conglomerate*

Undifferentiated Mesozoic
- M — *Siltstone, sandstone, conglomerate*

Middle Ordovician
- Om11 — *Sandstone*
- Om10 — *Sandstone, shale*
- III — Om9 — *Sandstone*
- Om8 — *Sandstone, coquinite, overlain by shale*

Lower Ordovician
- Ol7 — *Limestone, marl*
- Ol6 — *Dolomite, sandstone*
- Ol5 — *Limestone, marl, dolomite, sandstone*
- II — €μ/Ol4 — *Dolomite, sandstone*
- €μ3 — *Limestone, sandstone, algae*

Upper Cambrian
- €μ2 — *Dolomite, sandstone*
- I — €μ1 — *Limestone, marl*

- *Established geological boundary, position approximate.*
- *Probable geological boundary.*
- *Probable fault.*
- *Axis and pitch direction of syncline, position approximate.*
- *Axis and pitch direction of anticline, position approximate.*
- *Axis of probable anticline.*
- *Strike and dip of bedding.*
- •B *Bore.*
- ■ *Homestead.*

Scale

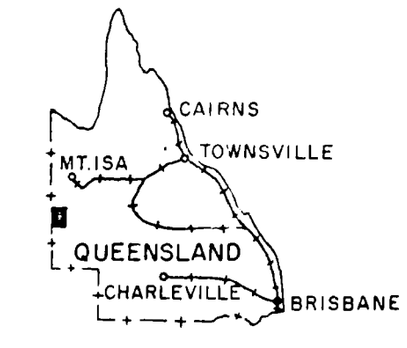
4 0 4 8 16 Miles

Section A-B

TOKO RANGE — TEN MILE HILLS — GLENORMISTON H.S.

A: 1000′ 600′ 200′ 0 -200′ — Om11 Om10 Om9 Om8 Ol7 Ol6 Ol5 M/€μ/Ol4 €μ3 M/€μ2 €μ1 €μ2 Ta/€μ/Ol3 Ta/Ol4 — B: 1000′ 600′ 200′ 0 -200′

III II I



Bureau of Mineral Resources, Geology and Geophysics. Canberra, A.C.T. July, 1959.

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